Republic of South Africa

EDICT OF GOVERNMENT

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SANS 10248 (2004) (English): Management of healthcare waste

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Edition 2

SOUTH AFRICAN NATIONAL STANDARD

Management of healthcare waste

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Table of changes

Change No.	Date	Scope

Abstract

Specifies criteria for the segregation, collection, movement, storage and disposal of waste materials within health care.

Keywords

chemicals, cytotoxicity tests, disposal, handling, hazardous substances, hospitals, incinerators, labels, recycling, waste disposal, waste handling.

Foreword

This South African standard was approved by National Committee StanSA SC 5140.06M, *National committee for dangerous goods standards – Disposal of clinical waste*, in accordance with procedures of Standards South Africa, in compliance with annex 3 of the WTO/TBT agreement.

This edition cancels and replaces the first revision (SABS 0248:1993).

Owing to the fact that information in respect of names and addresses of competent authorities and certification authorities dealing with dangerous goods is subject to change, details of the competent authorities and certification authorities are given in a general advice sheet provided with this standard. This advice sheet will be updated every six months and it is the responsibility of the competent authority/certification authority to notify Standards South Africa of any changes. The advice sheet will be available, free of charge, from the Standards Sales Department of Standards South Africa.

Annex A is for information only.

Introduction

This standard presents the basic elements of the management of healthcare waste. In this respect certain issues are considered to be of importance for successful application of this standard, namely

a) the need to deal with the management aspects of healthcare waste in addition to the technical operation of healthcare waste disposal,

b) the need for a document suitable for audit purposes that can be administered over a broad range of healthcare facilities which may have greatly varying resources,

c) the need to control the potential for the spread of infectious diseases that can place the public and especially waste disposal workers at risk, and

d) the need for guidelines covering the entire cycle, including waste minimization, point of use disposal through internal and external transport to final treatment and disposal.

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Management of healthcare waste

1 Scope

This standard lays down provisions for the safe and effective management of healthcare waste in order to reduce potential risks to people's health and risks to the environment.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. All standards are subject to revision, and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this standard are encouraged to take steps to ensure the use of the most recent editions of the standards indicated below. Information on currently valid national and international standards and other publications can be obtained from Standards South Africa.

SANS 1518-1, *Transport of dangerous goods – Design requirements for road vehicles and portable tanks – Part 1: Requirements applicable to all vehicles*.

SANS 10228, *The identification and classification of dangerous goods for transport*.

SANS 10229 (SABS 0229), *Packaging of dangerous goods for road and rail transportation in South Africa*.

SANS 10230 (SABS 0230), *Transportation of dangerous goods – Inspection requirements for road vehicles*.

SANS 10231 (SABS 0231), *Transportation of dangerous goods – Operational requirements for road vehicles*.

SANS 10232-1 (SABS 0232-1), *Transportation of dangerous goods – Emergency information systems – Part 1: Emergency information system for road transportation*.

SANS 10232-3 (SABS 0232-3), *Transportation of dangerous goods – Emergency information systems – Part 3: Emergency response guides*.

SANS 10233 (SABS 0233), *Transportation of dangerous goods – Intermediate bulk containers*.

SS 01 91 02, *Colour atlas 96*.

2.2 Other publications

Pantone color formula guide 1000. Moonachie, NJ: Pantone Inc. 1991.

3 Definitions and abbreviations

For the purposes of this standard, the following definitions and abbreviations shall apply:

3.1 Definitions

3.1.1
activity
disintegration rate of a radioactive substance at a given time per time interval and measured in becquerels (Bq)

NOTE Bq = 1 disintegration per second.

3.1.2
anatomical (pathological) waste
waste that contains tissues, organs, body parts, foetuses and animal carcasses but excludes blood, body fluids, teeth and hair

NOTE 1 Anatomical waste is considered as a subcategory of infectious waste, even though it can also include healthy body parts.

NOTE 2 Animal carcasses generated by the public are not covered by this definition.

3.1.3
antineoplastic
inhibiting or preventing the development of abnormal growth of tissue (neoplasm) of the body, for example, a tumour.

3.1.4
calorific value
see heating value

3.1.5
capacity
optimal quantity of waste that can be processed in a given time under certain specified conditions, usually expressed in terms of mass per 24 hours

3.1.6
clearance levels (in the context of radioactive waste management)
set of values established by the regulatory authority and expressed in terms of activity concentrations or total activities, at or below which sources of radiation can be released from regulatory control

3.1.7
clinical glass
glass that might be contaminated with blood, body fluids or chemicals, for example, blood collection tubes, laboratory glassware and medication vials

3.1.8
collection
accumulation of wastes from intermediate storage sites for movement to a primary waste holding area or from several primary waste holding areas to the treatment or final disposal site (or both)

3.1.9
colour coding
use of colour on a container or bag or the label attached to such, that serves to identify the category of waste that it contains

3.1.10
conditioning
operations that produce a package suitable for handling, transportation, storage, or disposal (or both)

3.1.11
container
disposable or reusable vessel in which waste is placed for handling, transportation, storage, or eventual treatment or disposal, (or both).

3.1.12
cytotoxic
possessing a specific destructive action on certain cells; used in particular in referring to the lysis (disintegration or dissolution) of cells brought about by immune phenomena and to antineoplastic drugs that selectively kill dividing cells

3.1.13
decontamination
reduction of microbiological contamination to a safe level

3.1.14
disinfectant
chemical agent that is able to reduce the viability of micro-organisms

3.1.15
disinfection
treatment aimed at reducing the number of vegetative micro-organisms to safe or relatively safe levels

NOTE 1 High-level disinfection is when all micro-organisms with the exception of small numbers of bacterial spores are killed.

NOTE 2 Intermediate level disinfection is where *Mycobacterium tuberculosis*, most viruses and fungi are killed, but not necessarily bacterial spores.

NOTE 3 Low-level disinfection is where most bacteria, some viruses and some fungi are killed, but the complete absence of resistant micro-organisms such as tubercle bacilli or bacterial spores cannot be relied on.

3.1.16
disposal
intentional burial, deposit, discharge, dumping, placing, or release of any waste material into or on any air, land or water in an approved, specified facility, for example, near surface or geological repository, or the approved direct discharge of effluents into the environment without the intention of retrieval

3.1.17
furnace
chamber of the incinerator into which the healthcare waste is charged for subsequent ignition and burning under controlled conditions

3.1.18
genotoxic
descriptive of a substance that is capable of interacting directly with genetic material, causing DNA damage that can be assayed

3.1.19
ground water
water occupying pores in the soil and cavities and spaces in rocks in the saturated zone of the profile by rising from a deep magmatic source or by the infiltration of rainfall

3.1.20
handling
functions associated with the movement of healthcare waste, excluding storage, treatment and ultimate disposal

3.1.21
hazard
intrinsic potential property or ability, for example, of any agent, equipment, material, or process to cause harm

NOTE Harm is an injury or damage to health of people or to the environment, (or both).

3.1.22
healthcare facility
healthcare facilities are all places (sites) where professional health services are dispensed to human or animal patients or where biological research is carried out and includes, inter alia, hospitals, clinics, rehabilitation centres, sick bays, old age homes, free-standing operating theatres, day units, mobile and stationary clinics, and physician's and veterinary's consulting rooms

3.1.23
healthcare waste
includes all the waste generated by healthcare facilities, research facilities, laboratories and waste originating from healthcare undertaken in the home, for example, dialysis and insulin injections

3.1.24
heating value
quantity of heat that is produced when a unit mass of a material (or calorific value) undergoes complete combustion under certain specified conditions and expressed in terms of calories or joules per kilogram (MJ/kg for solids and liquids and MJ/m^3 for gases)

3.1.25
incineration
controlled burning of solid, liquid, or gaseous combustible wastes to produce gases and residues containing little or no combustible material

3.1.26
micro-organism
any microbiological entity, cellular or non-cellular, capable of replication or of transferring genetic material

3.1.27
monitoring
continuous or non-continuous measurement of a concentration or other parameter (radiation or radionuclide concentration in the context of radioactive waste management) for purposes of assessment or control of environmental quality or exposure and the interpretation of such measurements

3.1.28
radionuclide
nuclide (i.e. an atom of specified atomic number and mass number) that exhibits properties of spontaneous disintegration, liberating energy, generally resulting in the formation of new nuclides

NOTE The process is accompanied by the emission of one or more types of radiation, such as alpha and beta particles and gamma rays.

3.1.29
radiotherapy
use of ionizing radiation to treat disease

3.1.30
recycling
extraction and recovery of material from scrap or other discarded material that can be reprocessed to manufacture a new product

3.1.31
repository
nuclear facility where radioactive waste is emplaced for disposal without the intention of future retrieval of the waste from the repository

3.1.32
residue
material, such as ash or slag, remaining after combustion or treatment of wastes or materials extracted from a liquid or gas stream

3.1.33
risk
probability that a hazard will cause harm, and the severity of that harm

3.1.34
segregation
systematic separation of healthcare waste into designated categories

3.1.35
sewage
community's liquid waste (domestic and industrial waste) carried off in sewers comprising of a combination of the liquid or water-carried wastes from domestic, municipal, and industrial premises

3.1.36
sewer
system for the collection and transport of sewage, including conduits, pipes, and pumping stations

3.1.37
sharps
items such as needles, syringes, blades, clinical glass and any other items that are capable of causing a cut or puncture wounds

NOTE Whether infected or not, such items are usually considered hazardous healthcare waste.

3.1.38
sterilization
reduction of more than 99.9999 % of the microorganisms present by means of physical, chemical, or mechanical methods, or by irradiation

3.1.39
storage
placement of waste in a suitable location or facility where isolation, environmental and health protection, and human control (for example, monitoring for radioactivity, limitation of access) with the intention that the waste will be subsequently retrieved for treatment or disposal (or both) (or clearance of radioactive waste)

3.1.40
treatment
any method, technique or process for altering the biological, chemical, or physical characteristics of the healthcare waste in order to reduce the hazards it presents and to facilitate its disposal by volume reduction, disinfection, neutralization, or other change of form

3.1.41
waste
undesirable or superfluous by-product, emission, residue or remainder of any process or activity, any matter, gaseous, liquid or solid or any combination thereof, which

a) is discarded by any person; or

b) is accumulated and stored by any person with the purpose of eventually discarding it with or without prior treatment connected with the discarding thereof; or

c) is stored by any person with the purpose of recycling, re-using or extracting a usable product from such matter

3.1.41.1
chemical waste
solid, liquid and gaseous products that are unusable from chemical processing, from diagnostic or experimental work, or from cleaning, housekeeping or disinfecting procedures that contains dangerous or polluting chemicals that pose a threat to humans or animals or the environment, if improperly disposed of

3.1.41.2
cytotoxic or genotoxic waste
waste capable capable of interacting with living cells and causing genetic damage

3.1.41.3
general waste
waste that does not pose an immediate threat to man or the environment, i.e. household waste, builders' rubble, garden waste, and certain dry industrial and commercial waste. It may, however, with decomposition, infiltration and percolation, produce leachate with an unacceptable pollution potential

NOTE General waste comprises materials such as office waste, kitchen waste (domestic waste), non-clinical glass waste, non-infectious non-anatomical waste, for example, paper tissues, disposable curtains, disposable nappies, dressings in contact with intact skin, extracted teeth, nail clippings, hair and decontaminated waste.

3.1.41.4
hazardous waste
waste that may, by circumstances of use, quantity, concentration or inherent physical, chemical or toxicological characteristics, have a significant adverse affect on public health and the environment when improperly treated, stored, transported or disposed of

NOTE Infectious waste is considered hazardous waste.

3.1.41.5
infectious non-anatomical waste
waste that contains or is suspected to contain, pathogens, bacteria, viruses, parasites or fungi in sufficient concentrations or quantities to cause disease in susceptible hosts

3.1.41.6
pharmaceutical waste
unused medicines, medications and residues of medicines that are no longer usable as medication

3.1.41.7
radioactive waste
liquid, solid or gaseous materials that contain, or are contaminated with, radionuclides at concentrations or activities greater than the clearance levels and for which no use is foreseen

3.1.42
waste generator
any person, organization or facility engaged in activities that generate waste

3.1.43
waste management
all the activities, administrative and operational, involved in the handling, treatment, conditioning, storage, and disposal of waste (including transportation)

3.1.44
waste package
product of waste conditioning, which includes the waste form, waste container(s), and any internal barriers (e.g. absorbing materials or liners), prepared in accordance with requirements for handling, transportation, storage, and/or disposal

3.2 Abbreviations

3.2.1 HR Hazard Rating

3.2.2 NCS Natural Color System ®

3.2.3 SI Systèm International d'Unités

NOTE This is a system of units of measurement developed to permit international harmonization and acceptability.

3.2.4 Sv sievert

4 Identification of healthcare waste

4.1 General

Collection is the first step towards removing the healthcare waste from its point of generation to its final destination. As this is the last link that the waste has with its source, it is necessary to ensure that the waste is correctly identified and labelled so as to render it traceable. Even more important is the need to ensure that the waste is segregated at the point of generation and contained in such a manner as to render minimal risk to the environment and to persons in the vicinity of the waste, for example, those handling and transporting it.

4.2 Classification

4.2.1 Hazard classes

All hazardous healthcare waste that is not of domestic origin (i.e. general waste) shall be classified in accordance with SANS 10228, as expanded on in relevant national legislation, provisions and requirements, or any other regulatory requirements of the relevant provincial and local governments (see annex B). The classification of hazardous healthcare waste, in accordance with the risk involved is given below.

Class 1: Explosives

Explosives of class 1 are regulated by relevant national legislation, provisions and requirements of the country (see annex B). The classification, transportation and disposal of explosives shall be approved by the relevant competent authority (see the advice sheet provided with this standard).

NOTE Class 1 is included for the sake of completeness, it is however considered unlikely that class 1 waste will arise as part of healthcare waste.

Class 2: Gases

This class is subdivided as follows:

a) **division 2.1**: flammable gases;

b) **division 2.2**: non-flammable non-toxic gases; and

c) **division 2.3**: toxic gases.

Class 3: Flammable liquids

This class comprises liquids with a closed-cup flash point not exceeding 60,5 °C.

Class 4: Flammable solids; substances liable to spontaneous combustion; substances that, on contact with water, emit flammable gases

This class is subdivided as follows:

a) **division 4.1**: flammable solids;

b) **division 4.2**: substances liable to spontaneous combustion; and

c) **division 4.3**: substances that, on contact with water, emit flammable gases.

Class 5: Oxidizing substances and organic peroxides

The class is subdivided as follows:

a) **division 5.1**: oxidizing substances; and

b) **division 5.2**: organic peroxides

Class 6: Toxic and infectious substances

This class is subdivided as follows:

a) **division 6.1**: toxic substances; and

b) **division 6.2**: infectious substances

Class 7: Radioactive material

This class comprises materials that spontaneously emit ionizing radiation.

Class 8: Corrosives

This class comprises substances that, by chemical action, cause damage to living tissue, to commonly used metals or to other packaging.

Class 9: Miscellaneous dangerous substances

This class comprises any substance not covered by the other classes, but that has been or could be shown by experience to be of such dangerous character that the provisions of this class should apply to it.

4.2.2 Hazard rating

4.2.2.1 After hazardous healthcare waste has been classified in accordance with SANS 10228 (see 4.2.1), the waste stream or its residue shall be further classified to determine its hazard rating. The hazard rating indicates the class of disposal site at which the healthcare waste can be disposed.

a) **Hazard rating 1**: healthcare waste that contains significant concentrations of extremely hazardous substances, for example, carcinogens, substances toxic for reproduction and mutagens such as mercury, dioxins and polychlorinated biphenyls, and infectious wastes.

b) **Hazard rating 2**: healthcare waste that contains highly hazardous substances that are not persistent such as certain carcinogens, for example, arsenic trioxide and benzene.

c) **Hazard rating 3**: healthcare waste that contains moderately hazardous substances that are potentially harmful to human health or to the environment but that are not persistent, for example phenols and fluorides.

d) **Hazard rating 4**: healthcare waste that contains low hazard substances in large quantities and that are potentially harmful in concentrations that in most instances represent only a limited threat to human health or to the environment, for example ethanol, acetic acid, etc.

4.2.2.2 Healthcare waste that does not resort under hazard ratings 1 to 4, and is regarded as non-hazardous in accordance with SANS 10228 (see 4.2.1), can be considered to be of such low hazard that, after approval has been obtained from the relevant national, provincial or local department(s) dealing with waste management in the country, it can be disposed of in an approved general waste landfill site. Such a site shall be lined, equipped with a leachate collection system and shall be managed in accordance with the relevant national legislation, provisions and requirements, or any other regulatory requirements of the relevant provincial and local governments (see annex B).

4.3 Waste categories, colour coding and marking of packaging

4.3.1 Healthcare waste is grouped into hazardous healthcare waste and general healthcare waste and are categorized as follows:

a) **hazardous healthcare waste categories**: infectious waste, anatomical (pathological) waste, sharps, chemical and pharmaceutical waste, and radioactive waste; and

b) **general healthcare waste categories**: packaging material, kitchen waste, office waste and building demolition waste, waste generated by patients that is not related to healthcare, non-infectious animal bedding, and garden and park waste.

4.3.2 A colour coding system is used for ease of identification of the different categories.

4.3.3 Table 1 gives the internationally accepted categories, sub-categories, colour coding, hazard ratings and labelling protocol for healthcare waste.

Table 1 — Healthcare waste categories, hazard ratings, colour coding and international hazard label

1	2	3
Waste category and hazard rating	**Waste sub-category**	**Colour coding and international hazard label**
Human or animal anatomical waste [a] **These wastes are classified under division 6.2, HR 1**	Infectious human anatomical Infectious animal anatomical Non-infectious animal anatomical	**RED** and the international infectious hazard label **ORANGE** and the international infectious hazard label **BLUE**
Infectious non-anatomical waste [a] **These wastes are classified under division 6.2, HR 1**	None	**RED** and the international infectious hazard label
Sharps **Sharps are classified under division 6.2, HR 1**	None	**YELLOW** , the words "**DANGER** "**CONTAMINATED SHARPS**" and the international infectious hazard label
Chemical waste including pharmaceutical waste **These wastes are classified under-classes 2, 3, 4, 5, 6.1 or 8, HR 1 – 4**	Chemical or pharmaceutical Cytotoxic pharmaceutical	**DARK GREEN** and the appropriate international hazard label **DARK GREEN** and the cytoxic hazard label
Radioactive waste **These wastes are classified under class 7, HR 1**	None	**No colour coding** only the appropriate international radiation hazard label
General waste	See 3.1.41.3	**BLACK**. No hazard label
[a] Chemical or radioactive solutions containing human or animal anatomical and infectious non-anatomical wastes are considered as chemical or radioactive wastes respectively		

4.4 Hazard label for cytotoxic waste

4.4.1 Cytotoxic waste is generated from several sources and can include the following:

a) contaminated material from drug preparation and administration, such as syringes, needles, gauges, vials and packaging;

b) outdated drugs, excess (leftover) solutions and drugs returned from the wards; and

c) urine, faeces and vomit from patients, which may contain potentially hazardous amounts of the administered cytotoxic drugs or of their metabolites and which should be considered genotoxic for at least 48 h and sometimes up to one week after drug administration.

4.4.2 Cytotoxic waste packaging shall be provided with the hazard label as depicted in figure 1. The triangle shall be printed in red on a black background and the text shall be in white.

Figure 1 — Cytotoxic hazard label

4.5 Hazard labelling for transport

4.5.1 The international hazard labels for transport shall be in the form of a square, set at an angle of 45° (diamond-shaped), and with minimum dimensions as given in table 2. The hazard label shall have a line that is the same colour as the symbol, 5 mm inside the edge of the hazard label and running parallel with it in the case of a label of dimensions of 100 mm square. For labels of other sizes, the distance of the line from the edge shall be reduced or increased in proportion to the size of the label.

Table 2 — Sizes of hazard labels

1	2
Net contents of packaging[a]	**Minimum size of label** mm
≥ 0,5 > 0,5 ≤ 5 > 5 ≤ 20 > 20	15 × 15 20 × 20 30 × 30 100 × 100
[a] Litres in the case of a liquid or gas and kilograms in the case of a solid substance.	

4.5.2 The hazard labels are divided into halves. With the exception of divisions 1.4, 1.5 and 1.6, the upper half of the label is reserved for the pictorial symbol and the lower half for text and for the class or division number and the compatibility group, as appropriate.

NOTE Class 1 is included for the sake of completeness; it is however considered unlikely that class 1 waste will arise as part of healthcare waste.

4.5.3 The colours of the hazard labels shall visually match colour reference numbers Pantone 151 or NCS S 0570-Y50R (orange), Pantone 192 or NCS S 0580-Y90R (red), Pantone 361 or NCS S 1565-G (green), Pantone 300 or NCS S 2065-B (blue) and Pantone 109 or NCS S 0570 G90Y (yellow). In case of a dispute the NCS colours shall take precedence.

Table 3 — International hazard labels

1	2
Class, division or subsidiary risk	**Hazard label**
1.1, 1.2, or 1.3	 (See NOTES 1 and 2)
1.4	 (See NOTE 2)
1.5	 (See NOTE 2)
NOTE 1 Insert the division for explosives (see SANS 10228), in the space marked * *. To be left blank if explosive is the subsidiary risk. NOTE 2 Insert the compatibility group (see SANS 10228), in the space marked *, denoted by a letter A to N (excluding I and M) and S as indicated in SANS 10228. To be left blank if explosive is the subsidiary risk.	

Table 3 (*continued*)

1	2
Class, division or subsidiary risk	**Hazard label**
1.6	 (See NOTE 2)
2.1	 
2.2	 
2.3	
3	 

Table 3 (*continued*)

1	2
Class, division or subsidiary risk	**Hazard label**
4.1	
4.2	
4.3	 
5.1	
5.2	

Table 3 (*continued*)

1	2
Class, division or subsidiary risk	**Hazard label**
6.1	
6.2	
7	
7	
7	

Table 3 (*concluded*)

1	2
Class, division or subsidiary risk	**Hazard label**
8	
9	 Drg.492a-x

5 Responsibilities

5.1 General management

The responsibilities of general management of a healthcare facility shall be to:

a) formulate a documented waste management policy;

b) assign responsibilities. However, the chief executive officer of a healthcare facility retains overall responsibility for ensuring that the management of healthcare waste is in accordance with the relevant national legislation and provisions, or any other regulatory requirements of the relevant provincial and local governments;

c) approve the implementation plan developed by the waste management team (see 5.2.1.1);

d) monitor and review the implementation; and

e) provide sufficient resources, especially in terms of finance, to the waste management team (see 5.2.2(d)).

5.2 Waste management team

5.2.1 General

5.2.1.1 It is recommended that management of a healthcare facility constitute a waste management team comprising (where possible) the following key members:

a) the occupational health and safety officer (as chairperson);

b) heads of departments;

c) the infection control officer;

d) the chief pharmacist;

e) the radiation officer;

f) the senior nursing officer;

g) the maintenance engineer (where possible);

h) the appointed waste management officer; and

i) the waste management contractor when applicable and when required.

5.2.1.2 Each member of the waste management team shall be responsible for specific tasks as given in 5.2.2 to 5.2.9.

5.2.1.3 Members of the waste management team can also hold other positions at the healthcare facility and perform their waste management team responsibilities on an add-on basis.

5.2.2 Occupational health and safety officer

The occupational health and safety officer shall be responsible for:

a) the development of a written waste management plan that defines the duties of all staff members in respect of handling healthcare waste;

b) the designation of a waste management officer;

c) the constant review and update of the waste management plan to ensure that it is compliant with regulations;

d) allocation of sufficient resources from general management for the maintenance of the waste management plan both in terms of finance and suitably trained team members;

e) the provision of onsite storage facilities if necessary, and the operation of the facilities in accordance with legislation; and

f) the compliance of onsite treatment facilities with all legal requirements of the country (see annex B).

5.2.3 Heads of departments

The heads of departments shall manage the generation of healthcare waste (including waste avoidance), segregation, containerization, storage and treatment or disposal (or both) of healthcare waste in their departments. They shall also carry the following responsibilities:

a) that all doctors, nurses, clinical and non-clinical professional staff

   1) are trained in the need for the segregation and storage procedures for waste generated, and

   2) comply with the waste management plan;

b) that key personnel in their departments receive the necessary training in the segregation, containerization, storage and internal transport of healthcare waste;

c) to liaise with the appointed waste management officer to note and remedy any found non-compliance; and

d) to liaise with the appointed waste management contractor to note and remedy any found non-compliance.

5.2.4 Senior nursing officer

The senior nursing officer shall be responsible for the training of nursing staff, assistants, attendants and ancillary staff in the correct procedures for segregation, containerization, storage and internal transport of healthcare waste.

5.2.5 Infection control officer

The infection control officer shall advise the waste management team on infection control and standards of healthcare waste treatment and disposal.

5.2.6 Chief pharmacist

The chief pharmacist shall be responsible for:

a) the minimization of pharmaceutical waste;

b) advice to the waste management team on pharmaceutical waste treatment or disposal (or both);

c) the coordinated monitoring of pharmaceutical waste generation, treatment or disposal; and

d) the training of staff involved in pharmaceutical waste disposal.

5.2.7 Radiation officer

The radiation officer shall

a) be responsible for the minimization of radioactive waste by storing short half-life radioactive waste until decayed to a surface dose rate not exceeding 5 µSv/h,

b) advise the waste management team on the segregation and disposal of radioactive waste,

c) coordinate the monitoring of radioactive waste production and treatment or disposal, and

d) be responsible for the training of staff involved in radioactive waste treatment or disposal (or both).

5.2.8 Maintenance engineer

The maintenance engineer shall be responsible for:

a) the instalment and maintenance of waste storage facilities and handling equipment, including any onsite waste treatment or disposal facilities; and

b) the training of staff in the operation and maintenance of such facilities and equipment.

5.2.9 Waste management officer

The appointed waste management officer shall

a) be responsible for the day to day operation and monitoring of the waste management plan,

b) control internal collection and transport of waste containers,

c) ensure sufficient supply of the appropriate healthcare waste disposal containers, protective clothing and transport to all areas,

d) directly supervise the staff assigned to containerize, collect, transport and store the healthcare waste within the healthcare facility,

e) ensure the correct operation of healthcare waste storage points to prevent the occurrence of unauthorized dumping,

f) monitor healthcare waste treatment both onsite and via collections by external healthcare waste collection contractors,

g) liaise with the other members of the waste management team to minimize any healthcare waste disposal anomalies and ensure compliance with the waste management plan, and

h) ensure that there are written contingency procedures in the event of failure of any aspect of the waste management plan and that appropriately trained personnel are aware of the action to be taken.

5.3 The waste management plan

5.3.1 General

5.3.1.1 To develop a waste management plan, the waste management team shall make arrangements with the appointed waste management officer for the assessment of all the healthcare waste generated in the healthcare facility (also see 7.1). The survey shall include an assessment that estimates any future changes in the growth, or designation, of the healthcare facility or its departments. Data from the survey shall form the basis on which the waste management plan is developed.

5.3.1.2 The healthcare waste shall be identified and classified in accordance with the provisions given in clause 4.

5.3.1.3 The waste management team shall establish and maintain a documented healthcare waste management plan that is in accordance with national guidelines or legislated policies, such that:

a) work instructions and procedures are documented and the designated operators understand these procedures and are trained to them;

b) control procedures are documented, implemented and maintained;

c) quality control procedures exist and are documented, implemented and maintained;

d) non-compliant procedures and the appropriate corrective actions taken are recorded; and

e) an emergency response policy and strategy for dealing with spills of infectious and chemical wastes is documented and appropriately distributed.

NOTE It is recommended that the waste management team considers the options and procedures given in *Self-assessment manual for proper management of medical wastes* (see the bibliography) when it develops a waste management plan.

5.3.2 Contractual commitments

5.3.2.1 Contracts for the treatment and disposal of the healthcare waste generated by the healthcare facility shall be entered into **only** when the waste management team is satisfied that the waste management contractor has made a full disclosure of its licensing or permit obligations and is suitably equipped for the proposed activities. References shall be provided by the waste management contractor and followed up by the healthcare waste generator.

5.3.2.2 The contractual commitments of the healthcare facility and the waste management contractor shall be in writing and shall clearly set out at least the following:

a) the specification or description of the types and volume of healthcare waste to be collected for treatment or disposal (or both);

b) where relevant, the treatment or the disposal process to be used, taking account of any special requirements;

c) the method of accounting for numbers of different healthcare waste units collected by the waste management contractor;

d) the verification of the physical condition of the healthcare waste packages received, and the treatment to be undertaken;

e) infection risks and other hazards; and

f) the responsibility for sorting, counting and collection of packages of healthcare waste for treatment or disposal (or both).

5.3.3 Documentation and data control

5.3.3.1 Documentation

The healthcare facility shall establish and maintain documented procedures to control all documents and data that relate to this standard. The controlled documentation shall include:

a) current operating manuals for all equipment, including specified operating conditions;

b) instructions and safety precautions for the handling and storage of all hazardous healthcare waste; and

c) the retention of all documentation, including certificates, that are required in terms of the relevant national legislation and provisions, or any other regulatory requirements of the relevant provincial and local governments' dealing with labour issues (see annex B).

NOTE It is recommended that the waste management industry and the healthcare waste generators collaborate in the production of "pro-forma" documentation for this purpose.

5.3.3.2 Data control

Data control shall be such that

a) documents issued are reviewed for adequacy by the waste management team before issue;

b) a master list exists of all controlled documents, that makes it possible to locate all controlled documents and to ascertain their revision status;

c) obsolete documents are withdrawn and replaced with current documentation; and

d) changes to documentation are authorized by the same level of authority as the original, i.e. the responsible person.

5.3.4 Waste management procedures

5.3.4.1 General

Healthcare waste management procedures shall include:

a) identification of the healthcare waste category in accordance with 4.3 and table 1;

b) segregation (see 7.2) of the components (where applicable) of the healthcare waste into the appropriate container;

c) storage of the healthcare waste at a point convenient to its generation until collected (see clause 6);

d) transport of the containerized healthcare waste to a central point for storage and despatch;

e) transport of the healthcare waste to the point of treatment;

f) treatment in such a manner that the resulting product is unrecognizable as of healthcare origin (also see clause 10); and

g) final disposal of the treated healthcare waste according to legislation (also see clause 10).

5.3.4.2 Procedures

5.3.4.2.1 The waste management team shall document procedures and work instructions for the disposal of waste (see 5.3.1.3).

5.3.4.2.2 Procedures shall include measures to control and monitor the processes in each department so as to achieve the specified cleanliness and infection controls.

5.3.4.2.3 Work instructions shall be formulated in a way and written in language that is easily understood by operators.

5.3.5 Inspection and quality control

In accordance with the waste management plan, each department shall furnish documentation that verifies

a) the categories of healthcare waste generated (see 4.3.1);

b) the number and sizes of containers of each category of healthcare waste generated for an agreed time period;

c) the date of collection;

d) the authorized collector and proposed final point of treatment or disposal (or both);

e) any deviations from the standard procedure;

f) any corrective actions taken; and

g) a record of treatment and disposal by the waste management contractor.

NOTE Recording at departmental level could be required by the waste management plan.

5.3.6 Health, safety and environmental policy

5.3.6.1 The waste management plan shall ensure that a clear policy on health, safety and environmental protection is issued and is communicated to all employees. The plan shall include recommendations for medical examination/check-up and, where deemed necessary, a policy on immunization for employees in contact with, or handling, healthcare waste.

5.3.6.2 The health, safety and environmental policy shall be supplemented and supported by house rules, which shall also govern the conduct of non-company personnel, and in particular healthcare waste management contractors that are appointed to render the service.

5.3.6.3 The health, safety and environmental policy shall be aimed at ensuring the safety and well-being of all employees, visitors and the community by preventing contamination of the environment.

5.3.6.4 The health, safety and environmental policy shall ensure that all laws and ordinances regarding air pollution, water pollution and soil pollution, occupational health and safety, and public hygiene are complied with. In addition, the policy shall ensure that any risks associated with infection and other hazards are considered and appropriate action taken by the Waste Management Officer to safeguard both the public and employees.

5.3.7 Work procedures

5.3.7.1 Work procedures shall be easy to read and understand and, to this end, shall be drawn up in the language of the country, English, and in one or more (as necessary) of the other official languages of the country.

5.3.7.2 Work procedures shall be posted at work places, and a system shall exist to ensure that all employees are made aware of the work procedures that they are required to follow. They shall also receive appropriate training in understanding the work procedures.

5.3.7.3 Work procedures shall include at least the following:

a) minimum number of personnel and the minimum qualifications required;

b) working hours, break times, rules on leaving the work area and rules for shift working;

c) work instructions for specific activities;

d) visual warnings and details on hazardous healthcare material, dangerous areas and technical facilities that can create hazards; and

e) all facilities and equipment, including the correct use of personal protective equipment, together with their locations that serve the safety of employees handling healthcare waste.

5.4 Training, supervision and workplace hygiene

5.4.1 Training

5.4.1.1 Before employees perform any tasks for the first time, they shall receive training from a person competent in at least the following:

a) the nature of the work;

b) the chain of command, including the name(s) of the person(s) responsible for the work area(s);

c) the handling of potentially hazardous waste, including the use of protective clothing; and

d) disposal procedures;

5.4.1.2 The training shall be repeated, refreshed and updated as necessary or at least once a year.

5.4.1.3 On every occasion on which training is given, the contents of the training and the date shall be confirmed in writing by means of the signature of each employee who is receiving training.

5.4.1.4 A system shall exist to ensure that additional training is given whenever a significant change takes place, for example when new equipment is installed and commissioned and in the event of potential hazards associated with any changes.

5.4.1.5 A sufficient number of employees shall receive the additional training to cover leave periods, absences owing to illness, and public holidays, and to ensure compliance with relevant in-house procedures.

5.4.2 Supervision

The waste management officer shall ensure adequate supervision of workers with regard to all operations, and in particular with regard to the safe handling of hazardous healthcare waste.

NOTE 1 It is recommended that staff handling hazardous healthcare waste be offered appropriate immunization, including hepatitis B and tetanus.

NOTE 2 It is recommended that staff that decline the immunization or that do zero-convert be advised in writing about the risk and that this might prevent them from carrying out work that could expose them to such risks.

5.4.3 Workplace hygiene

5.4.3.1 No eating, drinking or smoking shall be permitted in areas where healthcare waste is handled and stored. "No smoking" signs shall be obeyed at all times.

5.4.3.2 Separate areas shall be designated or provided for eating, drinking and, if permitted in terms of company policy and national legislation, smoking.

5.4.3.3 Employees shall wash their hands before and after eating, drinking, smoking or using the toilet, and after work.

5.4.3.4 All injuries, including minor traumas, shall receive immediate attention and be documented.

5.4.3.5 A regular supply of clean overalls, gloves and footwear or other appropriate safety equipment for onsite wear shall be provided, and employees shall wear the clothing as designated.

5.4.3.6 Employees shall be provided with protective clothing. Employees who handle or come into contact with hazardous healthcare waste (including but not limited to infectious waste) shall, in addition to overalls, be provided with suitable gloves, aprons and, where necessary, face masks or breathing apparatus.

5.4.3.7 On leaving the work area, employees who handle hazardous healthcare waste shall remove their protective clothing, place them in the designated containers and wash or shower (as appropriate) and put on clean clothes. Such employees are specifically prohibited from entering clinical areas or recreation or eating facilities, without taking these precautions. Employees in "clean" areas shall not enter potentially contaminated areas unless they wash and don clean overalls or other protective clothing on their return to the clean area.

5.4.3.8 Management and visitors shall not enter work areas where potentially hazardous healthcare waste is handled without the appropriate protective clothing.

5.4.3.9 Personal protective equipment and facilities shall be kept clean and in a good condition.

5.4.3.10 Washing facilities (showers and hand-wash basin with hot and cold water, and soap or shampoo) shall be provided.

5.4.3.11 Lockers for storing personal clothing and property shall be situated away from work areas, and shall not be the same lockers used to store work clothing and personal protective equipment.

5.4.3.12 An emergency shower or eye-wash facility shall be provided in the washroom area and where chemicals are stored or handled.

5.4.3.13 The following special provisions for personal hygiene shall be adhered to at all times:

a) clean work clothing shall be worn each day;

b) work clothing shall be washed between uses by a laundry facility equipped to handle clothes worn in a healthcare facility;

c) used protective clothing shall not be hung up or stored in a "clean" locker, but shall be placed in the designated containers (see 5.4.3.7); and

d) protective clothing shall be changed after each work period or at the end of a shift. When disposable protective clothing has been used it shall be disposed of in the container provided for this type of clothing immediately after use.

6 Waste storage

6.1 Temporary healthcare waste store

6.1.1 The waste management plan shall clearly designate the position of each temporary healthcare waste store and collection point for each department, and define the categories (see 4.3.1) of healthcare waste generated there.

6.1.2 Such a temporary store shall be so sited as to offer minimal risk hazard by contamination to the main operations of that area, for example, there shall be no risk of contamination of medicines, foodstuffs, textiles or infection hazard to staff, patients and visitors.

6.1.3 The waste management plan shall designate times and routes for healthcare waste collection from such designated temporary waste stores.

6.2 Central healthcare waste store

6.2.1 The central healthcare waste store shall be clearly demarcated as such.

6.2.2 Separate storage areas shall, where applicable, be so demarcated as to cater for the categories of healthcare waste (see 4.3.1) stored therein. See 6.3 for the provisions for the storage of the designated healthcare waste categories.

6.2.3 Only healthcare waste that is properly packaged and appropriately labelled (see 4.3 and table 1) shall be accepted in a main waste store.

6.2.4 The store shall have an impermeable slip-resistant, hard-standing floor that is easy to clean and that has good drainage as part of a water management system that connects to a sewer.

6.2.5 The store shall be so designed as to be cool (out of direct sunlight), have good (passive) ventilation, be well lit and shall have a water supply to facilitate cleaning.

6.2.6 The store shall afford easy access to staff handling the healthcare waste and for vehicles collecting and delivering waste.

6.2.7 Where possible, consideration should be given to the refrigeration of certain stores where required by the type of waste and the period for which it might be stored.

6.2.8 Unless a refrigerated storage room is available, storage times for healthcare waste, i.e. the delay between generation and treatment/disposal, shall not exceed the following:

a) **temperate climate**: 72 h in winter and 48 h in summer; and

b) **warm climate**: 48 h during the cool season and 24 h during the hot season.

6.2.9 The store shall be capable of being locked, access controlled and be so designed as to be inaccessible to unauthorized personnel, vermin, insects and birds.

6.2.10 The store shall be so designed as to accommodate the volume of waste for which it is so designated.

6.2.11 The store shall be equipped with the necessary protective clothing and emergency equipment, for example, fire extinguishers, as appropriate, to deal with spillage or fire.

6.3 Provisions for the storage of designated waste categories

6.3.1 Infectious waste

6.3.1.1 An infectious waste store shall be clearly marked “INFECTIOUS WASTE “ and display the international infectious hazard label (see table 3).

6.3.1.2 This store shall be the repository for the following healthcare waste categories:

a) infectious human and animal anatomical waste;

b) infectious non-anatomical waste;

c) blood; and

d) sharps.

6.3.1.3 Infectious healthcare waste shall be stored in containers that comply with the requirements given in 7.3.

6.3.1.4 The store shall be capable of being locked, access controlled and so designed as to be inaccessible to unauthorized persons.

6.3.2 Chemical and pharmaceutical waste

6.3.2.1 A chemical waste store shall be clearly marked “CHEMICAL WASTE” and display the appropriate international hazard labels (see table 3) for the classes of dangerous chemicals stored therein.

NOTE Non-hazardous chemical waste consists of other chemicals than those described in 6.3.2.3 to 6.3.2.7 and includes such chemicals as sugars, amino acids and certain organic and inorganic salts.

6.3.2.2 All chemical healthcare waste shall be stored in containers that comply with the requirements of 7.3.4. in a store that can be locked, is access controlled and is so designed as to be inaccessible to unauthorized persons.

6.3.2.3 Cytotoxic pharmaceutical waste shall be stored in a separate part, that can be locked, of the chemical store, and shall be clearly marked "CYTOTOXIC WASTE" (see 4.4 and figure 1).

6.3.2.4 Toxic chemical waste shall be stored in a separate area marked "TOXIC WASTE" and display the appropriate international hazard symbol.

6.3.2.5 Liquid chemical waste, for example, acids and alkalis, shall be stored in a separate bunded area that is clearly marked with the appropriate international hazard labels of the chemicals stored therein. The bunded area shall be of such capacity as to contain 1,5 times the volume of chemicals stored in the area, in case of a spill.

NOTE It is recommended that acids and alkalis are segregated in the storage area.

6.3.2.6 Solvent waste shall be stored in a bunded area clearly marked with the appropriate international hazard label.

NOTE It is recommended that flammable liquid waste be stored in a separate solvent store fitted with heat activated fire extinguishers, appropriate for the types of fire that might occur as well as for the types of chemicals stored.

6.3.2.7 Reactive chemicals, for example those that are highly oxidizing, or reactive with water, or explosive, or shock sensitive, shall be stored in an area clearly marked with the appropriate international hazard labels that signify the hazards.

6.3.2.8 Material Safety Data Sheets (MSDSs) of the chemicals stored shall be kept in the chemical store to be available to the staff handling the waste. The staff shall be trained in the contents of the MSDSs and particular attention shall be drawn to the meanings of the specific hazard risk warnings (R-phrases) and safety advice (S-phrases) likely to be found on the MSDSs.

NOTE SANS 10265 can be consulted regarding the format of an MSDS and the meanings of the R-phrases and S-phrases.

6.3.3 Radioactive waste

6.3.3.1 This store shall be clearly marked "RADIOACTIVE WASTE" and display the international hazard label (see table 3). The telephone number of the radiation officer shall appear on the hazard label so that he/she can be contacted in the event of an emergency.

6.3.3.2 The storage area shall be constructed in a manner that renders it flameproof and shall have such surfaces on floors, benches and walls as to facilitate decontamination.

6.3.3.3 The storage area shall be fitted with an extraction system and air monitoring shall be performed.

6.3.3.4 The storage area shall be equipped with enough shielding material, either in the walls, or as movable shielding material as to ensure that individuals outside the storage area do not receive unnecessary exposure.

6.3.3.5 The storage area shall be locked at all times to prohibit unauthorized access.

6.3.4 General waste

The storage area for general healthcare waste shall be so constructed as to comply with the requirements given in 6.2 and shall be so sited as to facilitate the loading of waste collection vehicles without constraining traffic flow to the healthcare facility.

7 Waste minimization, segregation and packaging

7.1 Waste minimization

The amount of healthcare waste generated by a healthcare facility can be minimized by careful preplanning, for example, by effective stock management, recycling where possible, and resource recovery. Healthcare waste can be minimized by taking the following into account:

a) avoidance of generating waste;

b) the provisions for the treatment or disposal (or both) of waste before a material is purchased;

c) the quantities of material purchased shall reflect the needs;

d) quantities of material with special treatment or disposal (or both) requirements shall be purchased in quantities to match the immediate needs;

e) hazardous material shall be replaced by non-hazardous ones, for example, by avoiding the use of dyes and material containing heavy metals, and avoiding the use of adhesives and tape based on polyvinyl chloride (PVC); and

f) material shall be recovered for reuse where possible.

7.2 Waste segregation

7.2.1 The key to effective management of healthcare waste is the correct identification of the waste, followed by segregation. Waste identification and segregation is the responsibility of those generating it.

7.2.2 Waste identification and segregation shall take place at the source where the waste is generated. The staff shall be trained on how to identify and segregate the waste correctly and training shall be refreshed annually (see 5.2.3 and 5.2.9).

7.3 Packaging for healthcare waste

7.3.1 General

7.3.1.1 Healthcare waste packaging shall be clearly marked with the appropriate colour code and the international hazard label(s) (see table 1 and table 3).

7.3.1.2 A label shall be so located on the packaging as to be visible when the packaging is stacked with other packaging of the same kind.

7.3.1.3 The lettering on a label shall be of size, style and layout that will result in marking that is clearly legible. The surface area immediately surrounding the label shall be of a colour that contrasts with the background of the label.

7.3.2 Packaging for infectious waste (excluding sharps)

7.3.2.1 Packaging for infectious waste shall be made from an appropriate impermeable material so as to be robust, leakproof and compatible with the envisaged treatment.

7.3.2.2 Packaging for infectious waste shall be filled to no more than three-quarters capacity and then securely closed.

7.3.2.3 Infectious waste contained in plastics bags can be closed by means of non-PVC plastics ties, steel wire, non-PVC plastics sealing tags of the self-locking type, or heat sealers purpose-made for healthcare waste. Bags shall **not** be closed by stapling.

7.3.2.4 Blood shall be collected in dedicated blood containers that are leakproof once sealed.

7.3.3 Packaging for sharps

7.3.3.1 A sharps container shall be used to collect all sharps and similar items, regardless of whether or not they are contaminated.

7.3.3.2 A sharps container shall be rigid, puncture-proof, tamper-proof and clearly marked in accordance with 7.3.1.

7.3.3.3 A sharps container shall be constructed, for example, from high density polypropylene in such a manner that not only the sharps, but also any residual liquids from syringes, are safely retained. The lid of a sharps container shall be such that it cannot be released once sealed.

7.3.3.4 The proper size of sharps container shall be available for each department, for example, where trochars are used, a large sharps container would be needed.

7.3.3.5 Consideration can be given to the installation of needle destructors (incinerators) at a site where needles are used, particularly when sharps waste disposal facilities are not optimal, for example, at a rural clinic, a medical practitioner, or an inoculation centre that has limited waste disposal facilities. However, this option is only applicable where a safe disposal system for the residue after incineration of the needles is available and provided that the needle incinerator is applied and maintained efficiently.

7.3.4 Packaging for chemical waste

7.3.4.1 General

7.3.4.1.1 Chemical waste intended for transport outside a healthcare facility shall be classified in accordance with SANS 10228 (see 4.2) and packaged in accordance with SANS 10229 or SANS 10233.

7.3.4.1.2 Chemical waste shall be sorted into the different hazard classes (see 4.2.1 and 7.3.4.2 to 7.3.4.8) and shall then be divided into chemical, pharmaceutical or cytotoxic waste, as applicable. Hazardous chemical waste of different classes shall **not** be mixed.

7.3.4.1.3 The packaging shall be clearly colour-coded dark green (see table 1) and marked in accordance with 7.3.1.

7.3.4.1.4 Chemical waste can be placed in empty containers that originally contained the same type of chemical, provided that the original label has been removed or clearly defaced.

7.3.4.2 Packaging for waste aerosol dispensers and gas cylinders of class 2

7.3.4.2.1 Waste aerosol dispensers

Waste aerosol dispensers shall be stored in black plastics bags that are clearly marked “Waste aerosol dispensers” in such a manner that they can be easily identified from general waste. A plastics bag that contains waste aerosol dispensers shall be itemised separately in order to be sent to a landfill or recovery facility and shall **not** be disposed of by incineration or by treatment in an alternative treatment facility.

7.3.4.2.2 Gas cylinders

Where appropriate, empty gas cylinders shall be returned to the supplier for re-use.

7.3.4.3 Packaging for waste flammable liquids of class 3

7.3.4.3.1 Chlorinated and non-chlorinated solvents shall be segregated and stored in separate waste containers.

7.3.4.3.2 A waste flammable liquid can be stored in a metal or a high density plastics container, or drum, that can be sealed with a screw cap lid. An alternative that might be acceptable to audit would be to store the waste solvents in the empty containers from which they were supplied (see 7.3.4.1.4).

7.3.4.3.3 Each container or drum shall be appropriately marked “CHLORINATED ORGANIC SOLVENT WASTE” or “ORGANIC SOLVENT WASTE”, colour-coded dark green (see table 1) and bear the international hazard label for flammable liquids of class 3 (also see 7.3.1). Where necessary, a bold warning “HIGHLY FLAMMABLE” or “FLAMMABLE” should be depicted.

7.3.4.4 Packaging for waste oxidizing substances and organic peroxides of class 5

7.3.4.4.1 Waste oxidizing substances (division 5.1) and organic peroxides (division 5.2) shall be kept apart and also segregated from other wastes. These wastes shall be stored in plastic-lined metal drums, or high density plastics drums, and shall be fitted with tamper-proof sealable lids.

7.3.4.4.2 A division 5.1 waste container shall be clearly marked "OXIDIZING CHEMICAL WASTE" and bear the international hazard label for oxidizers of division 5.1 (also see 7.3.1).

7.3.4.4.3 A division 5.2 waste container shall be clearly marked “ORGANIC PEROXIDE WASTE” and bear the international hazard label for organic peroxides (also see 7.3.1).

7.3.4.5 Packaging for waste toxic substances of class 6, division 6.1

7.3.4.5.1 Waste toxic substances shall be segregated in such a manner that each type is stored in a separate container. The containers shall be made of metal or high density plastics and be capable of being sealed with a screw cap lid or a tamper-proof lid.

7.3.4.5.2 Each container shall be clearly marked to show the type of toxic chemical waste that it contains, shall be colour-coded dark green and bear the international hazard label for toxic substances (also see table 1 and table 3).

7.3.4.5.3 The storage of empty containers that have been used to supply extremely toxic chemicals, for future use as waste storage containers is **NOT RECOMMENDED**.

7.3.4.6 Packaging for pharmaceutical waste, including cytotoxic or genotoxic waste

7.3.4.6.1 Pharmaceutical waste

WARNING! SPECIAL PRECAUTIONS ARE TO BE TAKEN TO PREVENT THE THEFT AND ILLEGAL DISTRIBUTION OF PHARMACEUTICAL WASTE.

7.3.4.6.1.1 Liquid pharmaceutical waste shall be collected in containers similar to those used to store toxic waste (see 7.3.4.5), clearly marked "PHARMACEUTICAL WASTE – LIQUID", be colour-coded dark green and shall bear the international hazard label for toxic substances of division 6.1 (see table 1 and table 3). When the pharmaceutical waste has a subsidiary risk of “flammability”, the international hazard label for flammable liquids of class 3 (see table 3) shall also be affixed to the waste container.

7.3.4.6.1.2 Solid pharmaceutical waste shall be stored in double layer plastics bags that are colour-coded dark green, labelled "PHARMACEUTICAL WASTE – SOLID" and bear the appropriate international hazard label(s).

7.3.4.6.1.3 The plastics bags shall be securely sealed, for example, by means of non-PVC plastics ties, steel-wire, non-PVC plastics sealing tags of the self-locking type, or heat sealers purpose-made for healthcare waste.

7.3.4.6.2 Cytotoxic or genotoxic waste

7.3.4.6.2.1 Sharp objects, for example needles and broken glass, that are contaminated with cytotoxic or genotoxic pharmaceuticals shall be segregated and stored in a sharps container (see 7.3.3) that is clearly marked "CYTOXIC SHARPS" or "GENOTOXIC SHARPS" and that bears the cytotoxic hazard label (see figure 1).

7.3.4.6.2.2 Cytotoxic and genotoxic pharmaceutical waste and associated contaminated materials, for example, syringes, tubing, containers, preparation materials, vials and ampoules, shall be stored in containers similar to those described for the storing of toxic waste (see 7.3.4.5). The containers shall be clearly marked "CYTOTOXIC WASTE" or "GENOTOXIC WASTE" and that bear the cytotoxic hazard label (see figure 1).

7.3.4.7 Packaging for radioactive waste of class 7

7.3.4.7.1 General

Waste generated in a radioactive controlled area of a healthcare facility shall be segregated at the point of origin into the three categories; inactive waste, low-level waste and high-level waste.

7.3.4.7.2 Inactive waste

Inactive waste include laboratory utensils, or other material, that have been used inside a radioisotope laboratory or in the vicinity of radioactive materials. Such waste has a low risk of contamination and can be disposed of in the general waste.

7.3.4.7.3 Low-level waste

7.3.4.7.3.1 Low level waste is radioactive waste with a surface dose rate not exceeding 5 µSv/h.

7.3.4.7.3.2 An acceptable method of handling low level radioactive waste is to store it in a refuse bin with a lid and lined with a strong plastics bag. When the plastics bag is three-quarters full, it shall be securely sealed, for example, with non-PVC adhesive tape, or it can be heat-sealed. The bag shall then be placed in another plastics bag, a box or another suitable container, for example, a drum, that is capable of being securely sealed.

7.3.4.7.3.3 The outer container shall be clearly marked “RADIOACTIVE WASTE” and shall bear the international hazard label for ionizing radiation (see table 1 and table 3).

7.3.4.7.3.4 Sharps that are contaminated with radioactive waste shall be stored in a sharps container that is clearly marked in accordance with the provisions given in table 1 and that bears the international hazard symbol for ionizing radiation.

7.3.4.7.4 High-level waste

7.3.4.7.4.1 High-level waste is radioactive waste that exceeds a surface dose rate of 5 µSv/h.

7.3.4.7.4.2 High-level radioactive waste shall be stored in specifically designed lead lined waste containers for decay to below a surface dose rate of 5 µSv/h (low-level waste). Alternatively, it shall be disposed of via appropriate arrangements with the relevant national department or regulatory body responsible for this function in the country.

7.3.4.8 Packaging for corrosive waste of class 8

7.3.4.8.1 Acids

7.3.4.8.1.1 Acid wastes that have a pH-value lower than 2 shall be segregated from other wastes and stored in appropriate glass or plastics containers that can be sealed with a screw cap lid.

7.3.4.8.1.2 Each waste acid container shall be clearly marked "ACID WASTE", colour-coded dark green and bear the international hazard label for corrosives (see table 1 and table 3)

7.3.4.8.2 Alkalis (bases)

7.3.4.8.2.1 Alkaline wastes that have a pH-value greater than 12 shall be segregated from other wastes and stored in appropriate plastics containers that can be sealed with a screw cap lid.

7.3.4.8.2.2 Each waste alkali container shall be clearly marked "ALKALI WASTE", colour-coded dark green and bear the international hazard label for corrosives (see table 1 and table 3).

7.3.5 Packaging for general healthcare waste

7.3.5.1 Solid general healthcare waste shall be placed in a waste container that is colour-coded black.

7.3.5.2 A plastics bag used for containment of general healthcare waste shall be of good quality that does not tear easily during handling and transport.

7.3.5.3 A general waste container shall not be filled to more than three-quarters of its capacity and shall be securely closed as to prevent spillage of the contents and access by scavengers or vermin.

7.3.5.4 Arrangements are to be made with a general waste service for the removal of high density materials like small amounts of building rubble and garden refuse, for example, by the provision of collecting containers.

8 Collection and transport of healthcare waste

8.1 Collection of waste within a healthcare facility

8.1.1 The healthcare facility's waste management plan shall include a detailed schedule for the collection of the wastes generated at the identified sources. This schedule shall include the following information:

a) a list that identifies the waste sources;

b) a plan of the location of the waste sources and the central waste store;

c) the name of the responsible officer for each shift at each waste source;

d) the name of the responsible officer for each shift at the central waste store;

e) a list that outlines the categories of waste likely to be generated at each waste source;

f) the appropriate route to be taken by the person(s) collecting waste for delivery to the central waste store; and

g) a timed collection schedule for the collection of the various waste categories that is designed to ensure that wastes are not incorrectly mixed and assigned to incorrect depositories nor that wastes that are potentially incompatible or that can contaminate each other, are collected and transported together.

8.1.2 The central waste store officer shall ensure that record is kept of the temporarily stored hazardous waste. At least the following data shall be recorded:

a) waste generator;

b) location of waste;

c) quantity;

d) composition and description;

e) classification (hazard class (see 4.2.1) and hazard rating (see 4.2.2));

f) recommended mode of treatment or disposal (or both);

g) date collected from the department or unit; and

h) written acknowledgement of receipt by the responsible officer at the waste source and the representative of the central waste store;

8.1.3 The waste management officer (see 5.2.9) shall ensure that the waste collection system is monitored and executed in accordance with the provisions of the waste management plan (see 5.3) and that all data produced from the consignment notes and any other sources are appropriately recorded.

8.2 Transport of waste within a healthcare facility

8.2.1 Healthcare waste can be transported within the healthcare facility by means of trolleys, wheeled containers or carts that are not used for any other purpose and that are easy to load and unload, have no sharp edges that could damage waste bags during loading and unloading and that are easy to clean.

8.2.2 The wheeled containers, trolleys or carts shall be cleaned and disinfected in accordance with a detailed and recorded system, shall be properly maintained and replaced when necessary.

8.2.3 Sufficient equipment, for example trolleys, wheeled bins, appropriate collection containers and bags, and protective clothing shall be provided to ensure efficient execution of the waste management plan (see 5.3).

8.2.4 The seals of waste bags shall be in place and intact at the end of the internal transport.

8.3 Collection of hazardous healthcare waste for off-site transport

8.3.1 General

8.3.1.1 The healthcare facility's waste management plan (see 5.3) shall include a schedule for the collection of the healthcare waste at the central hazardous waste store, and the treatment/disposal of healthcare waste by a waste management contractor when applicable and when required (see 5.2.1.1(i)).

8.3.1.2 The waste management company contracted to the healthcare facility shall provide documentation to show that their own, or subcontracted, treatment or disposal (or both) procedures and facilities is appropriately licensed, has adequate capacity, and shall provide documentation to show, for each category of waste that it is to collect, that its own, or subcontracted, treatment or disposal facility complies with the relevant national legislation and provisions, or any other regulatory requirements of the relevant provincial and local governments (also see 5.3.2).

8.3.1.3 A system of consignment notes that can provide data for records of waste treatment or disposal (or both) activities shall be in place.

8.3.1.4 An emergency back-up plan shall be in place that provides procedures which constitute low risk to the public and the environment if, or when, there is a failure in the off-site waste collection and treatment or disposal system.

8.3.2 Contractual requirements

8.3.2.1 A written contractual agreement shall be concluded between a healthcare facility and a waste management company for the collection and treatment or disposal (or both) off-site of its waste. Such a contract shall stipulate:

a) the categories of waste to be collected;

b) the methods of treatment or disposal (or both) of each category of waste;

c) the approximate mass or volume of each waste category likely to require treatment or disposal (or both) (also see 5.3.2.2);

d) a timed collection schedule that is so designed as to ensure that wastes are not wrongly mixed and assigned to incorrect depositories nor that wastes that are potentially incompatible, or that can contaminate each other, are collected and transported together; and

e) the health and safety measures to be implemented, including immunization and personal protective equipment that will be used.

8.3.2.2 The following data shall be recorded on collection of healthcare waste by the waste management company:

a) the signatures of the responsible officer at the central waste store and the representative of the waste management company;

b) the time and date; and

c) the amount of waste collected in accordance with the categories generated.

8.3.2.3 Where possible, emergency collection and treatment or disposal (or both) procedures that offer “low risk” to the public and the environment in cases where the contracted treatment or disposal (or both) system fails, shall be agreed on, for example, arrangements with other treatment or disposal (or both) facilities where available.

8.3.2.4 The waste management company shall provide the waste management officer (see 5.2.9) of the healthcare facility with proof of the final treatment or disposal (or both) of the healthcare waste.

8.3.2.5 The waste management officer (see 5.2.9) shall monitor the waste collection contract and ensure that it complies with the provisions of the waste management plan (see 5.3) and that all data produced from consignment notes, and any other sources, are appropriately recorded.

8.4 Off-site transport of hazardous healthcare waste

A vehicle transporting hazardous healthcare waste off-site a healthcare facility shall be in compliance with SANS 10230, SANS 10231, SANS 10232-1, SANS 10232-3 and SANS 1518-1.

9 Spillage of hazardous healthcare waste

9.1 Policy and strategies

9.1.1 The waste management plan (see 5.3) shall have a documented policy and appropriate strategies for managing spills of infectious and chemical wastes.

9.1.2 The documented strategy shall include the following:

a) a method to notify the person(s) designated to supervise and execute the cleanup;

b) a documented method for the isolation (including any traffic control that may be required) and cleanup (including recovery from the damaged vehicle) of each type of spillage;

c) information on the type and location of the appropriate personal protective equipment for the staff executing the cleanup;

d) procedures for the protection of the public and other staff not involved in the cleanup;

e) procedures for the correct containment and disposal of the different categories of waste spilled; and

f) a method to notify relevant authorities.

9.2 Procedures for spillage cleanup

9.2.1 Infectious and hazardous chemical waste spills

The following procedures shall be followed by staff members and cleanup personnel in case of spillage of infectious and hazardous chemical waste:

a) evacuate and isolate the area of the spillage to limit its spread;

b) determine the nature of the spill and inform the emergency response team leader;

c) remove affected persons from the area and provide first aid if necessary;

d) ensure that the cleanup personnel are supplied with the appropriate personal protective clothing and cleanup equipment;

e) collect the spilled material in a container appropriate for the waste category;

f) decontaminate the area using the procedure appropriate for the type of spillage, and finally rinse the area with clean water;

g) decontaminate or dispose of the personal protective clothing and the cleanup equipment in accordance with the procedures given in the waste management plan (see 5.3)

h) when appropriate, arrange for all affected personnel to attend a medical examination, followed up by preventative treatment where required; and

i) complete the incident report form.

NOTE It is recommended that a “SPILL KIT” comprise at least the following:

– elbow-length gloves, closed shoes, full overalls, safety glasses, and respirators;

– absorbent material, for example, vermiculite;

– disinfectant, for example, a 2 % solution of glutaraldehyde;

– brooms, dustpans and shovels; and

– medical waste containers, heavy duty plastics bags and a selection of the appropriate “stick-on” hazard labels.

9.2.2 Cytotoxic pharmaceutical spills

The following procedures shall be followed by staff members and cleanup personnel in case of spillage of cytotoxic pharmaceuticals:

a) evacuate people near the spillage or release of the contaminant promptly, particularly when the contaminant is of a form that can easily disperse, for example gases, aerosols or volatile products;

b) inform the emergency response team leader, giving precise details of the nature of the spillage and then isolate, and when appropriate, mark off (using a marker or adhesive tape) the area of the spill. Areas contaminated by easily dispersed cytotoxic substances shall be kept isolated until it can be decontaminated by trained personnel; and

c) arrange for the decontamination of persons likely to have been contaminated. Priority shall be given to attending to those that show any signs of acute intoxication. Any clothing likely to have been contaminated shall be removed and stored in appropriately labelled sacks.

NOTE It is recommended that when drawing up plans to deal with cytotoxic spillages the waste management team might wish to refer to *Laboratory handling of mutagenic and carcinogenic products* 1998, WHO/PCS/98.9.

10 Treatment and disposal methods

10.1 General

10.1.1 The provisions given in this standard for healthcare waste treatment and disposal shall comply with the minimum requirements that a healthcare facility shall meet to demonstrate a "duty of care".

10.1.2 Disposal of untreated healthcare waste by landfill is not allowed and disposal to the sewerage system shall be limited to the disposal of sewage and wash water from storage areas.

10.1.3 The different categories of healthcare waste (see 4.3) require different methods of treatment and disposal, each appropriate to the potential hazard that they pose to human life and the environment.

10.1.4 The operators and maintenance staff of incineration, treatments and disposal facilities shall receive specialized training applicable to that specific technology.

10.2 Disposal via discharge to a municipal sewer

10.2.1 Most municipal sewerage systems are so designed and operated as to accept infectious material in the form of domestic sewage. However, the healthcare facility has a "duty of care" not to discharge healthcare waste to a sewer other than domestic sewage.

10.2.2 It is the responsibility of the waste management team to identify any operational need to dispose to a sewerage system any waste that can present a substantially greater risk than domestic sewage. The waste management team members shall determine whether such waste can be treated to make it safe before discharge to a sewer in accordance with the operational requirements of the sewage treatment operators, and shall document the procedures.

10.2.3 The following wastes have specific discharge consents or restrictions and shall not be discharged to a sewer:

a) pharmaceutical wastes because they are likely to comprise prescription-only medicines that are subject to special waste regulations; and

b) mercury.

10.2.4 Radioactive waste intended for disposal to a sewer is restricted to aqueous solutions of radioactive material and macerated biological material from diagnosis and intensive radiotherapy, provided that this is acceptable to the waste water authorities of the country (see annex B).

10.2.5 Sanitary products that contain quantities of plastics material that cannot be digested by the sewerage treatment system shall be noted and the appropriate precautions shall be documented to minimize their discharge to a sewer.

10.3 Disposal of healthcare waste by incineration or alternative technologies

10.3.1 Incineration

10.3.1.1 Incineration followed by landfilling of the residue so formed at an appropriate landfill site that holds a permit (see 10.3.4.1) is an accepted strategy for the disposal of hazardous healthcare waste.

10.3.1.2 Restrictions on emissions, structural requirements and the operating parameters of the treatment plant or disposal plant (or both) shall comply with the requirements of the relevant national legislation or any other regulatory requirements of the relevant provincial and local governments (see annex B).

10.3.1.3 Wastes containing heavy metals, for example, mercury or cadmium, shall not be incinerated because of the risk of atmospheric pollution. Such wastes shall also not be disposed of in general municipal landfills because they might pollute the ground water. It is recommended that wastes containing mercury, cadmium or other heavy metals be sent to industries that specialize in the recovery of these metals, or that they be disposed of in an appropriate landfill site (see 10.3.1.1).

NOTE Polyvinyl chloride (PVC) should preferably not be incinerated as hydrochloric acid and dioxin are emitted.

10.3.1.4 Environmental impact assessment studies shall be done in accordance with the relevant national legislation and provisions, or any other regulatory requirements of the provincial and local departments of environment (see annex B) on all incinerators or disposal facilities (or both). Such assessments shall include the evaluation of the performance levels of the incineration or disposal facility (or both) in accordance with the air emission guidelines of the relevant national legislation and provisions, or any other regulatory requirements of the relevant provincial and local governments (see annex B).

10.3.2 Alternative technologies to incineration

10.3.2.1 An alternative technology to incineration, such as autoclaving, microwaving and chemical disinfection, can be used for the treatment or disposal (or both) of hazardous healthcare waste, provided that such a technology is authorized in terms of legislation.

10.3.2.2 The throughput rates of the alternative treatment or disposal facility (or both) shall be appropriate for the types and amounts of healthcare waste to be treated.

10.3.2.3 When sizing alternative treatment or disposal equipment (or both), the types of waste that the technology can treat, as well as the portion of the waste stream that cannot be treated, shall be taken into consideration. The cost of treatment of the excluded waste shall be accounted for when comparing overall costs of alternative technologies.

10.3.2.4 The alternative technology applied shall provide efficient sterilization or disinfection and shall be cost effective.

10.3.2.5 The treatment or disposal (or both) of human and animal anatomical waste, and chemical and pharmaceutical waste by alternative technologies, other than incineration, can be problematic. It shall therefore be ensured that these types of waste can be treated in such a manner by the alternative technology that the resulting product is unrecognizable as well as being safe.

10.3.2.6 An environmental impact study shall be undertaken in all instances for the facility of an alternative treatment or disposal technology (or both). The process shall comply with the occupational health and safety provisions of the relevant legislation and provisions of the country (see annex B).

10.3.3 Incinerators or alternative treatment facilities operated on-site at healthcare facilities

10.3.3.1 Operational requirements

10.3.3.1.1 An on-site incinerator or alternative healthcare waste treatment (or both) disposal facility shall be operated in accordance with the manufacturer's specifications and the conditions of authorization.

10.3.3.1.2 The operational procedures followed shall be monitored in order to prevent damages to the equipment of the waste treatment or disposal facility (or both) by the waste stream.

10.3.3.1.3 All incinerators and alternative technology treatment or disposal units (or both) require an environmental impact assessment to be approved and authorized by the relevant national or provincial department of environment.

10.3.3.1.4 Blood or other waste with a high moisture content shall be blended with dry waste in the sequence that it is fed into an incinerator or alternative treatment facility in order to retain a constant temperature.

NOTE Anatomical, chemical and pharmaceutical waste may often be problematic for types of treatment other than incineration (also see 10.3.2.5).

10.3.3.1.5 The cooling water used in wet de-ashing systems shall be evaluated for its potential impact on the environment and it shall be disposed of appropriately in accordance with the relevant national legislation and provisions, or any other regulatory requirements of the relevant provincial and local governments.

10.3.3.2 Record keeping

10.3.3.2.1 Data shall be recorded on the hazardous healthcare waste supplied, delivery dates, times, temperatures and other appropriate parameters, including the names and shift records of the operating staff.

10.3.3.2.2 Data shall be recorded on the mass of the ash or residue produced and its appropriate classification for hazardous (H) or general (G) landfill disposal. Hazardous waste landfill sites are divided into two types according to the hazard rating of the waste that they are designated to handle. H:H landfills can accept all hazardous ratings of wastes, while H:h landfills can only accept hazard ratings 3 and 4, and general waste.

10.3.4 Incinerators or alternative treatment and disposal facilities operated off-site from healthcare facilities

10.3.4.1 Operational requirements

When the management of a healthcare facility enters into a contractual agreement with a waste management contractor for the treatment or disposal (or both) of hazardous healthcare waste, they shall ensure that:

a) the waste management contractor's or subcontracted incineration plant or alternative treatment or disposal facility (or both) complies with the relevant national legislation and provisions, or any other regulatory requirements of the relevant provincial and local governments (see 8.3.1.2 and annex B);

b) the procedures and facilities of the incinerator or alternative treatment or disposal facility (or both) is approved and authorized (see 8.3.1.2) for each type of hazardous waste submitted to them;

c) the residual product resulting from the incineration or alternative treatment or disposal (or both) of the healthcare waste is disposed of in an appropriate landfill (see 10.3.3.2.2); and

NOTE In South Africa the residue is classified in accordance with annex B of SANS 10228 and the *Minimum requirements for the handling, classification and disposal of hazardous waste* (also see annex B of this standard).

d) the incineration or alternative treatment or disposal facility (or both) has adequate capacity.

10.3.4.2 Record keeping

10.3.4.2.1 The management of a healthcare facility shall ensure that the waste management contractor has appropriately documented work instructions and that waste treatment or disposal records (or both) are maintained.

10.3.4.2.2 Audits of the waste management contractor's or subcontracted incineration or alternative treatment or disposal facility (or both) shall be carried out by the waste management officer at least once a year.

11 Disposal by small-scale healthcare waste generators

11.1 General

11.1.1 The principles and precautions of this standard are equally as applicable to individual generators of hazardous healthcare waste, for example, general practitioners, dentists, nursing and frail-care homes, as they are to hospitals and clinics. At the same time, the safe disposal of hazardous healthcare waste is just as much the responsibility of the independent self-employed generator as it is that of the management of larger healthcare facilities.

11.1.2 It is illegal to use domestic waste collection services provided by local authorities or private contractors to dispose of any healthcare waste that might offer risks to the public and the environment.

11.2 Waste categorization and segregation

11.2.1 The small-scale generator shall become familiar with the healthcare waste categories given in table 1 together with the appropriate colour coding, labelling and marking of the types of waste that will be generated on the premises.

11.2.2 The small-scale generator of healthcare waste shall procure the appropriate waste containers (see 7.3) that are correctly labelled and marked in accordance with the provisions given in 4.4 and 4.5 of this standard.

11.2.3 It is the responsibility of a small-scale generator to ensure that all healthcare waste generated on the premises is segregated (see 7.2) and packaged (see 7.3) in accordance with the provisions of this standard.

11.2.4 The small-scale generator shall ensure that all staff members likely to handle or package healthcare waste that is potentially hazardous are appropriately trained, equipped and aware of the risks associated with handling such wastes.

11.2.5 When a small-scale generator does not create sufficient hazardous healthcare waste to justify a contractual agreement with a waste management contractor for its collection, then arrangements can be made to deliver the waste to a local hospital healthcare waste store, or to a waste management contractor's facility.

11.2.6 Deliveries of hazardous healthcare waste shall be made in packaging that is appropriately labelled and marked (see 11.2.3). The waste packages shall be transported in a suitable strong, locked, leakproof container in such a manner that any hazardous healthcare waste so transferred does not present a risk to the public and the environment.

11.2.7 The transport container shall be disinfected appropriately after each delivery and records shall be maintained of its use and disinfection.

11.3 Disposal of healthcare waste generated in private dwellings

11.3.1 The volume of potentially hazardous healthcare waste generated by a patient treated at home is generally very small, and is usually handled by the patient or by family members assisting the patient. The healthcare professional providing the treatment to be administered to the patient or by assisting family members shall ensure that any potential risks from any healthcare waste products are clearly understood and that appropriate waste disposal packaging is supplied together with information of appropriate disposal routes.

11.3.2 When a patient receives treatment at home from a visiting healthcare professional, there is a "duty of care" on the part of the healthcare professional to ensure that any potentially hazardous healthcare waste emanating from treatment so given, is disposed of appropriately.

11.3.3 In terms of the provisions given in this standard, a healthcare professional providing treatment to a patient in a private home shall either have with him the appropriate packaging for the waste to be generated, or to use it to take away and dispose of such waste. Alternatively, it shall be ensured that the patient is supplied with appropriate waste packaging and that arrangements have been made with a waste management contractor to collect the waste on a regular basis at the home, or that arrangements have been made for the waste to be delivered to a local pharmacy, clinic or healthcare practitioner to be included in its waste disposal inventory.

NOTE Because of the small volume of waste like sanitary pads, condoms, band-aids and "home made" bandages their risks are regarded as low enough so that these products can be disposed of in the domestic waste stream.

Annex A
(normative)

Minimal programmes for healthcare waste management
(The basis of the text for this annex has been taken from "Safe management of wastes from health-care activities", 1999, WHO, Geneva)

A.1 Introduction

A.1.1 This annex summarizes the waste management practices recommended in this standard and selects options that are considered suitable for use ONLY by remote rural healthcare facilities where legal requirements cannot be met and that can apply only minimal programmes.

A.1.2 The practices are designed to ensure that health and safety requirements are met and an acceptable level of hazard protection is achieved. However, the requirements are not a substitute for the longer-term aim of establishing the more rigorous managerial procedures given in this standard and would in most instances require a particular time limited exemption by the relevant authorities.

A.1.3 The waste management practices given in this annex shall be restricted to remote rural healthcare facilities or emergency field hospitals where no waste treatment facilities or waste management services exist. The management procedures of the healthcare waste shall be limited to the waste generated by that specific community.

A.1.4 The management of a rural healthcare facility intending the implementation of the requirements of this annex shall formulate a documented waste management plan based on clause 5 of this standard.

A.2 Basic principles

A.2.1 Exposure to hazardous healthcare waste results in health risks to the public, patients, healthcare personnel, waste workers and the environment. Waste management measures can reduce such risks substantially. A recommended first step would be the introduction of waste segregation; for example, the separation of sharps could be a good starting point. Specific methods for the disposal of hazardous healthcare waste could then be introduced in gradual stages.

A.2.2 Effective confinement of waste and safe handling measures provide significant health protection, for example:

a) burning hazardous healthcare waste in open trenches or small furnaces is better than uncontrolled dumping;

b) reducing the amount of hazardous healthcare waste by segregation is better than accumulating large quantities;

c) good stock management of chemicals and pharmaceuticals not only reduces waste quantities but also saves purchase costs; and

d) proper identification of healthcare waste packages warns healthcare personnel and waste handlers about their contents.

All these measures to reduce risk are relatively simple and cheap and can be applied by any remote rural healthcare facility that does not have access to sophisticated technology. The principle of "doing something is better than doing nothing" is important and underlies any effort to initiate a system for the management of healthcare waste.

A.2.3 The basic elements of minimal programmes of healthcare waste management are represented schematically in figure A.1. At the local level, the following basic actions shall be taken:

a) assessment (qualitative and quantitative) of waste production;

b) evaluation of local treatment and disposal options;

c) segregation of healthcare waste from general waste;

d) establishment of internal rules for waste handling, for example, colour coding, labelling, storage, collection frequency, etc.;

e) assignment of responsibilities for these functions within the healthcare facility; and

f) choice of appropriate available treatment and disposal options.

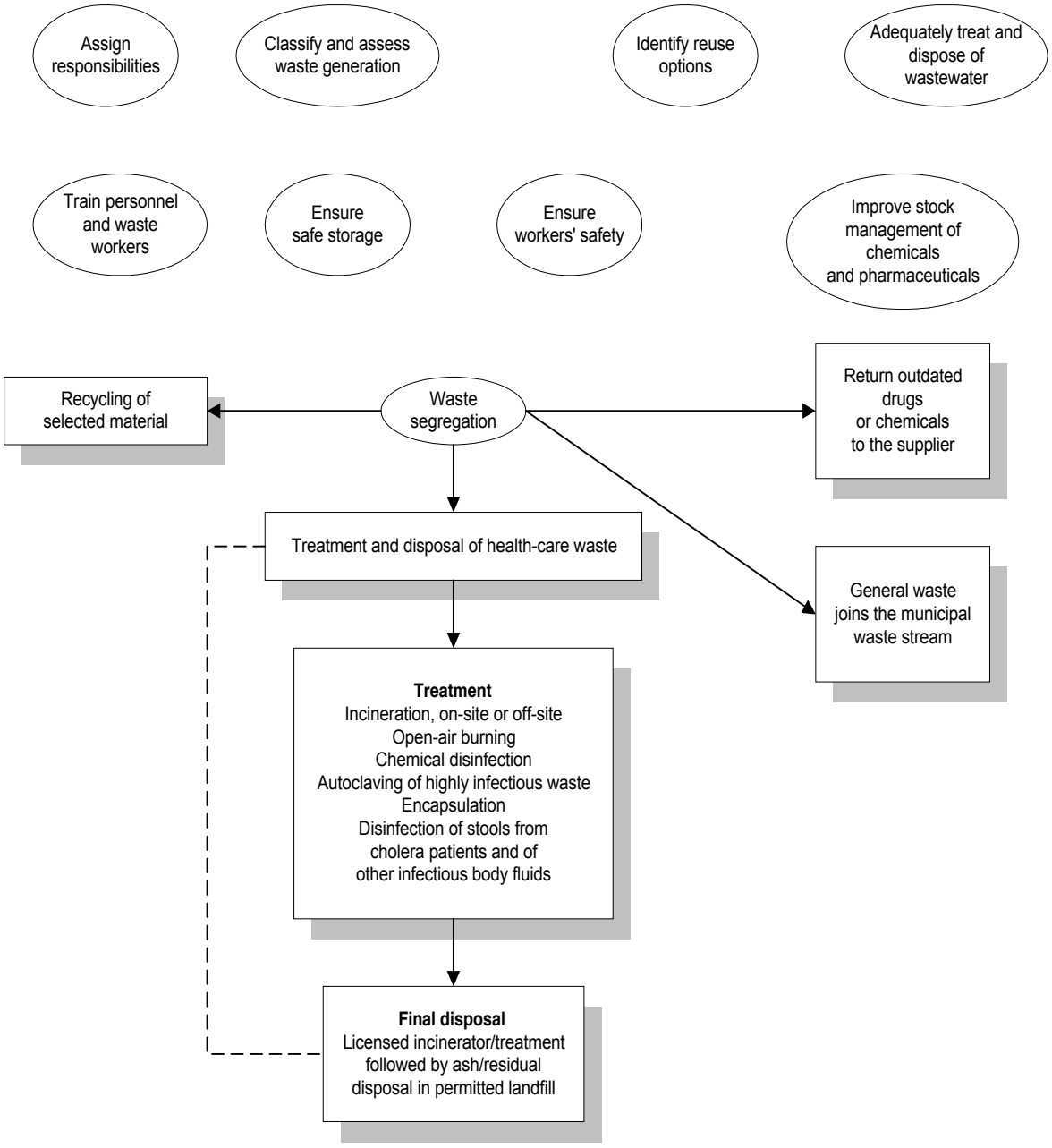

Figure A.1 — Basic steps in healthcare waste management in minimal programmes

A.3 Healthcare waste categories

A.3.1 General

As it is unlikely that facilities that need guidance on minimal programmes will be generators of radioactive waste, the likely healthcare waste to be generated has been divided into three main categories:

a) general (non-risk) waste, including uncontaminated waste similar to domestic waste. This type of waste usually represents about 80 % of the total waste production from healthcare facilities;

b) hazardous healthcare waste; and

c) highly hazardous healthcare waste.

A.3.2 Hazardous healthcare waste

A.3.2.1 Hazardous healthcare waste include the “usual" infectious waste, like anatomical waste, and waste contaminated with blood or other body fluids, excreta and vomit, but excluding sharps. This category typically makes up about 75 % of the hazardous healthcare waste, or around 15 % of the total waste produced by healthcare facilities.

A.3.2.2 Chemical and pharmaceutical residues, for example, cans, bottles or boxes containing such residues, and small quantities of outdated products are regarded as hazardous healthcare waste.

A.3.2.3 Non-recyclable pressurized containers, for example, aerosol dispensers, that are hazardous when burned as they then present an explosive hazard.

A.3.3 Highly hazardous healthcare waste

Highly hazardous healthcare waste include:

a) sharps, especially hypodermic needles;

b) highly infectious non-sharp waste, including microbial cultures, carcasses of inoculated laboratory animals, highly infectious physiological fluids, pathological waste;

c) stools from cholera patients or body fluids of patients with other infectious diseases;

d) bulk quantities of outdated hazardous chemicals, such as strong disinfectants, or significant quantities of waste containing mercury;

e) blood and blood components;

f) genotoxic or cytotoxic waste and radioactive waste. **If minimal waste management programmes are being applied these substances shall NOT be used in the healthcare facility.**

A.4 Segregation and packaging

A.4.1 In any area that generates hazardous healthcare waste, for example, hospital wards, treatment rooms, operating theatres and laboratories, three bins plus a separate sharps container will be needed.

A.4.2 Recommendations for the segregation of waste are given in table A.1. The following important points need to be noted:

a) if hazardous and highly hazardous healthcare waste are to be disposed of in the same way, they shall not be collected separately;

b) if sharps are to be encapsulated (see A.7.4.3), it is convenient to collect them directly in the drums used for encapsulation as this will limit the hazards associated with handling;

c) for hazardous and highly hazardous healthcare waste, the use of double packaging, for example, a plastics bag inside a container, is recommended to facilitate cleaning; and

d) stools of cholera patients shall be collected in buckets and disinfected before discharge to sewers (see A.7.3.3).

A.4.3 Wherever possible, containers of hazardous healthcare waste are to be marked with the appropriate international hazard label (see table 1 and table 3).

A.4.4 When a healthcare facility cannot afford disposable plastic bags or containers, hazardous waste can be collected in an appropriate paper bag inserted into a plastics or metal container. Such a container shall be disinfected using an appropriate disinfectant each time before reuse. Paper bags or plastics bags shall be filled to no more than three quarters of their capacity and then sealed.

Table A.1 — Segregation of healthcare waste

1		2		
Waste		**Packaging**		
Category	**Description**	**Type**	**Colour code/label**	**Properties**
Highly hazardous	Highly infectious non-sharp waste	Container or plastics bag in a holder	Red; labelled HIGHLY INFECTIOUS	Leak-proof and suitable for autoclaving
Hazardous	Infectious non-sharp waste	Container or bag (paper or plastic) in a holder	Red; labelled INFECTIOUS	Leak-proof
Sharps	Sharps	Sealable box or drum	Yellow; labelled DANGER CONTAMINATED SHARPS	Puncture-proof and leak-proof
Hazardous	Chemical and pharmaceutical waste	Container or bag (paper or plastic) in a holder	Dark green	Leak-proof
General	Similar to municipal waste and not contaminated	Plastics bag	Black	Having appropriate strength

A.5 Safe handling and storage

A.5.1 It is possible that ward help and hospital cleaning personnel might handle hazardous healthcare waste and they will therefore need to be informed about the potential risks posed by the waste. They shall be trained in safe handling procedures and shall be equipped with appropriate personal protective equipment, for example, protective aprons and gloves.

A.5.2 Healthcare waste shall not be stored close to patients or where food is prepared and shall preferably be collected daily. General waste can be stored at convenient places in the healthcare facility to facilitate collection by the municipal service, but hazardous healthcare waste shall be stored in a closed room.

A.5.3 Infectious waste shall be disposed of within the following time periods:

a) a maximum of 48 hours during the cool season; and

b) a maximum of 24 hours during the hot season.

A.5.4 Waste bags and containers shall be sealed and correctly labelled according to their category (see table A.1) and with the name and address of the generator, before loading for transport off-site.

A.5.5 For safety reasons, it is strongly recommended that healthcare facilities that apply minimal waste management programmes in areas that are without adequate treatment facilities, dispose of their hazardous healthcare waste within their own premises.

A.6 Minimization and safe recycling of healthcare waste

A.6.1 Chemicals and pharmaceuticals

A.6.1.1 The first step in chemical and pharmaceutical waste minimization is careful management of stores. The following practices are recommended:

a) frequent ordering of small quantities rather than large amounts at one time; this is particularly applicable to unstable products;

b) checking product expiry dates at the time of delivery;

c) use of the oldest batch of a product before a newer batch;

d) use of **all** the contents of each bottle or box; and

e) prevention of product wastage, for example, in wards and during cleaning procedures.

A.6.1.2 Ideally, chemical and pharmaceutical waste should be limited to residues of these products in their original packaging.

NOTE Scheduled pharmaceuticals have to be classified in accordance with the requirements of the relevant department of the country (see annex B) and appropriately disposed of in accordance with A.7.4.2.

A.6.2 Aerosol dispensers and gas cylinders

Aerosol dispensers are not recyclable and shall be disposed of to landfills together with general waste. Empty gas cylinders shall be returned to the original supplier for re-use.

A.6.3 Mercury

A.6.3.1 Droplets of spilled mercury can be recovered by using a spoon or a paper scoop. Waste mercury shall be stored in a plastics container with a screw cap and which is clearly marked “MERCURY WASTE – DANGER".

A.6.3.2 A vacuum cleaner shall not be used to recover spilled mercury metal as mercury vapour will be dispersed.

A.6.3.3 It is recommended that mercury waste be sent to the nearest general hospital in order to be offered to industries that specialize in the recovery of the metal, or alternatively, be disposed by a waste management contractor.

A.6.4 Recyclable sharps

A.6.4.1 It is recommended that a rural healthcare facility that has very limited resources make use of recyclable sharps, for example, glass syringes with needles, and scalpels that are designed to withstand the sterilization process.

A.6.4.2 Recyclable sharps shall be thoroughly cleaned and sterilized before re-use as disinfection alone is inadequate.

A.6.4.3 Sterilization methods that can be used are chemical sterilization, exposure to a flame and autoclaving. In cases where a healthcare facility lacks autoclaving facilities recyclable sharps can be sent to the closest general hospital for sterilization.

A.7 Treatment and disposal of hazardous healthcare waste

A.7.1 General

The treatment and disposal processes given in A.7.2 to A.7.4 shall be carried out **only** as a last resort and **only** if approval has been obtained from the relevant national, provincial or local authorities (see annex B).

A.7.2 Thermal processes

A.7.2.1 Static-grate single-chamber incineration

A.7.2.1.1 Hazardous healthcare waste can be burned in a simple furnace that has a static grate and natural airflow. In such an incinerator, it is normal to load the waste manually and to empty the ash manually. Properly segregated healthcare waste usually has a low heating value and small amounts of kerosene can be added to help start the fire. Where possible, blowing air through the fire will improve combustion.

A.7.2.1.2 A burning efficiency of about 90 % to 95 % can be reached with an incinerator so operated. This can result in about 5 % to 10 % of the original waste remaining unburnt in the ash and slag. The operating temperature of about 300 °C for this type of incinerator is sufficient to kill most micro-organisms but will be insufficient to destroy thermally resistant chemicals or pharmaceuticals.

A.7.2.1.3 The advantages of the process are:

a) good disinfection efficiency;

b) large reduction in the mass and volume of the healthcare waste;

c) the resulting ash and slag are suitable for landfilling or burial;

d) low capital investment and inexpensive to operate; and

e) highly skilled operators are not required.

A.7.2.1.4 The disadvantages of the process include:

a) the likelihood of atmospheric pollution from smoke and fly ash, and unpleasant odours; and

b) incomplete destruction of some sharps and heat resistant chemicals and drugs, for example cytotoxics.

A.7.2.2 Drum or brick incinerators

A.7.2.2.1 When a single-chamber incinerator is not available, simple confined burning can be applied. A steel drum or walls of bricks or concrete can be erected over a steel screen or fine grate and the top covered with a second screen to minimize dispersion of ashes or light material. The healthcare waste is placed inside and burned using the natural ventilation. Combustion can be assisted by the addition of kerosene before lighting the fire. Constant supervision is essential, particularly to prevent any escaping ashes from causing fires in the surroundings. It is unlikely that the temperature of the fire will exceed 200 °C and thus the combustion efficiency could reach about 80 % to 90 %. This type of burning will kill most micro-organisms but will be insufficient to destroy heat resistant chemicals and pharmaceuticals.

A.7.2.2.2 The advantages of the process are

a) considerable reduction in the mass and volume of the healthcare waste;

b) the process is cheap to erect and operate; and

c) the ash and slag are suitable for landfilling or burying.

A.7.2.2.3 The disadvantages of the process include:

a) the likelihood of appreciable atmospheric pollution from smoke, particulates and unpleasant odours; and

b) incomplete destruction of some heat resistant chemicals and sharps.

A.7.2.3 Open-air burning

A.7.2.3.1 It is preferable that open-air burning takes place in the pit of final disposal where the residues will be buried. Such burning shall be supervised by the person responsible for healthcare waste management at the facility and shall take place downwind of, and as far away as possible, from the healthcare facility and other communities. It shall be ensured that the area within which burning is carried out is adequately fenced to prevent unauthorized entry by persons or animals.

A.7.2.3.2 Open-air burning is much less efficient than confined burning (see A.7.2.1 and A.7.2.2). Contact with the unburnt material in the ashes can present a great risk to personnel and the practice is discouraged.

A.7.3 Chemical disinfection

A.7.3.1 General

A.7.3.1.1 Chemical disinfectants can be costly and their usage requires trained technicians. It is therefore recommended that the process be restricted to the disinfection of recyclable sharps and the stools of cholera patients.

A.7.3.2 Chemical sterilization of recyclable sharps

Chemical sterilization of scalpels, syringes with needles, and other recyclable sharps can be considered as an alternative or complementary to thermal sterilization. After thorough cleaning and drying, the sharps shall be placed in a container that can be sealed gastight and exposed to a strong disinfecting gas or liquid, for example, ethylene oxide, formaldehyde or a 2 % glutaraldehyde solution.

A.7.3.3 Chemical disinfection of stools from cholera patients

Vibrio cholerae, the causative agent of cholera, is not very resistant. It can be eliminated without using strong chemical disinfectants. Buckets that contain the stools of patients that have acute diarrhoea can be disinfected by adding calcium hypochlorite powder, unslaked lime (CaO) or other appropriate liquid or powder disinfectants.

NOTE In the case of cholera epidemics it is strongly recommended that all hospital sewage be treated and disinfected.

A.7.3.4 Advantages and disadvantages of chemical disinfection

A.7.3.4.1 One advantage of chemical disinfection is that the process provides very effective sterilization.

A.7.3.4.2 The disadvantages of the chemical disinfection include:

a) trained technicians are required;

b) chemical disinfectants are expensive; and

c) disinfectant chemicals are hazardous and necessitate safety measures.

A.7.4 Safe disposal of healthcare waste

A.7.4.1 General

A.7.4.1.1 Burial of infectious waste inside the premises of a healthcare facility shall only be allowed after approval has been obtained for the proposed pit or burial site from the relevant national, provincial or local department(s) dealing with waste management or disposal sites (or both) (see annex B).

A.7.4.1.2 Risks to health and risks of environmental pollution on the disposal of healthcare waste on the premises of the healthcare facility can be limited by:

a) severe restriction of access to the disposal site to authorized personnel only;

b) lining of the burial pit with low permeability material, for example compacted clay;

c) burying only hazardous waste;

d) encapsulating sharps in impermeable containers (see 7.4.3); and

e) immediate covering of each new waste deposition with a layer of earth with a thickness of of approximately 150 mm, and where possible, the addition of lime in order to reduce the development of odours and infestation by rodents or insects.

A.7.4.2 Disposal of pharmaceutical waste

WARNING! SPECIAL PRECAUTIONS SHALL BE TAKEN TO PREVENT THE THEFT AND ILLEGAL DISTRIBUTION OF PHARMACEUTICAL WASTE.

Pharmaceutical waste shall not be discharged to a sewer. Pharmaceutical waste is likely to comprise prescription-only medicines that are subject to special waste regulations. It is recommended that such pharmaceuticals be returned to the manufacturers or be treated to render them non-hazardous for disposal by landfill.

A.7.4.3 Disposal of sharps

The recommended method for encapsulating sharps is to collect them in puncture-proof, leak-proof containers, for example, high-density polyethylene boxes or metal drums. Once the container is three-quarters full, the upper space shall be filled with an inert filler, for example cement mortar, bituminous sand, plastics foam or clay and the container shall then be closed. Small amounts of chemical or pharmaceutical residues can be included with the sharps for co-disposal.

NOTE Encapsulation is not recommended for non-sharp infectious waste; such waste should rather be treated with disinfectant prior to burial.

A.7.4.4 Disposal of incinerated healthcare waste

A.7.4.4.1 Ash resulting from incineration or burning of healthcare waste shall be treated with 10 % lime and disposed of at the working face of small and communal disposal sites and immediately covered with general waste.

A.7.4.4.2 Disposal of this additional volume of healthcare waste shall not cause the disposal site to result in another category of landfill as stipulated in relevant national, provincial or local legislation, provisions, or requirements of the country (see annex B).

A.7.5 Disposal of chemically disinfected healthcare waste

A.7.5.1 Chemically disinfected healthcare waste shall be disposed of at an approved hazardous waste disposal facility, or at an appropriate disposal site after consultation with the relevant national, provincial or local government(s) dealing with waste management or disposal sites (or both) (see annex B).

A.7.5.2 Where there is no waste water treatment plant available to the healthcare facility, blood shall be chemically disinfected prior to discharge to a sewer (see A.7.3).

NOTE Many disinfectants are readily inactivated by organic matter (stools, blood, cotton mops, etc.) and low concentration solutions might have little or no effect.

Annex B
(informative)

Acts, regulations and other publications

The following Acts, regulations and other publications are relevant to this standard for the management of health care waste in South Africa.

Atmospheric Pollution Prevention Act, 1965 (Act 45 of 1965)

Environment Conservation Act, 1989 (Act No. 73 of 1989)

Hazardous Substances Act, 1973 (Act 15 of 1973)

National Road Traffic Act, 1996 (Act 93 of 1996)

Occupational Health and Safety Act, 1993 (Act 85 of 1993)

Department of Health, *Proposed regulations for the control of environmental conditions constituting a danger to health or a nuisance*, Government Gazette January 2000.

Department of Water Affairs and Forestry, *Minimum requirements for the handling, classification and disposal of hazardous waste, second edition 1998.*

Department of Water Affairs and Forestry, *Minimum requirements for waste disposal by landfill, second edition 1998.*

Department of Health, Directorate of Radioactive Control,

– *Code of practice for the management and disposal of non-nuclear radioactive waste,* WSCP91-1, November 1991, revised February 2001.

– *Guidelines for the safe transport of radioactive material.*

– *Requirements for the safe use of unsealed radioactive nuclides,* April 1993, revised April 1994 and February 2001.

Bibliography

Standards

CAN/CSA-Z317.10-88, *Handling of waste materials within health care facilities.* Canadian Standards Association, 1988.

SANS 10265:1999, *The classification and labelling of dangerous substances and preparations for sale and handling.*

Other publications

California. Department of Health Services, *Self-assessment manual for proper management of medical waste.* Prepared by self-assessment project partnership between the California Health Services and the California Health Care Association. 2nd ed. rev. 1999.

World Health Organization. *Laboratory handling of mutagenic and carcinogenic products*. Geneva: WHO, 1998. Unpublished document WHO/PCS/98.9; IPCS Training Module No. 2.

World Health Organization. *Safe management of wastes from health-care facilities*. Edited by A. Prüs, E. Giroult and P. Rushbrook. Geneva: WHO, 1999.

United Kingdom Health Services Advisory Committee. *Safe disposal of clinical waste*. 2nd ed Norwich: Hmso, 1999.